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# Automation-Ready Framework

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#H2020CoEXist
@H2020_CoEXist

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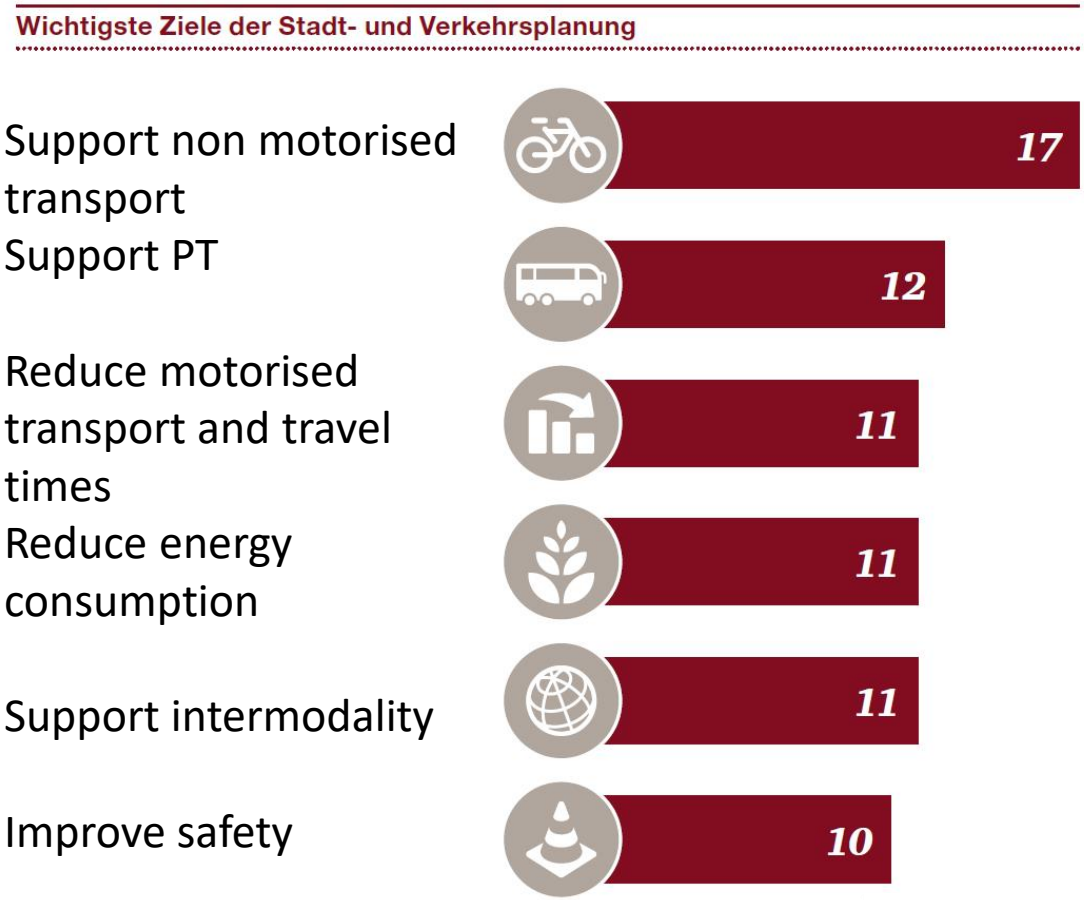
# City and Transport Planning Goals




- Support non motorised transport — Negative
- Support PT — Negative
- Reduce motorised transport and travel times — Neutral
- Reduce energy consumption — Neutral
- Support intermodality — Negative
- Improve safety — Positive



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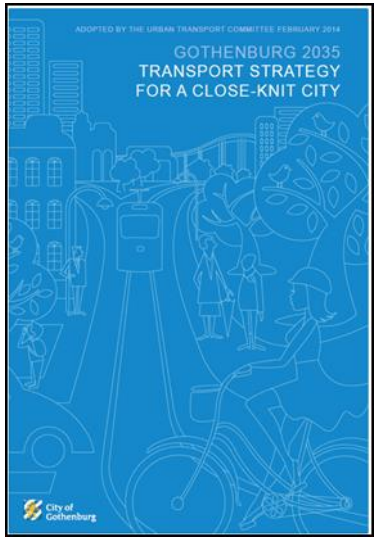
# Uncertainties for Local Authorities

- Current hype creates unrealistic expectations of the technology (pro-innovation bias)
- Timeframe is unrealistic: level 5 sharing systems are still far away vs. whereas level 4 PT with adjusted infrastructure is possible.
- (Connected) Infrastructure requirements are not clearly formulated yet.
- Long transition phase where conventional vehicles coexist with partially and fully automated vehicles.
- Unclear how later (as well as first) generations of vehicles at different automation levels will behave
- Unclear impacts: at which point will vehicle kilometres increase or decrease?
- **Result of uncertainties →**
- **CAVs are not mentioned in SUMPs or other strategic transport planning documents**

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# CoEXist in brief

- **Objective:**
  - The mission of the H2020 CoEXist project is to systematically increase the capacity of local authorities and other urban mobility stakeholders to get ready for the transition towards a shared road network with increasing levels of connected and automated vehicles (CAVs)

- **Automation-Ready:**
  - Micro- and Macroscopic Transport Modelling
  - Hybrid Road Infrastructure
  - Local Transport Policies



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# Project Details

- Programme: EU H2020-ART05
- Duration: May 2017 – April 2020
- Total Budget: 3,474,065 €
- Strategic Aim:
  - To bridge the gap between automated vehicles (AVs) technology and transportation and infrastructure planning by strengthening the capacities of urban road authorities and cities to plan for the integration of AVs on the same network.
- Partners:
  - **16 partners** from **7 European countries** (Belgium, France, Italy, Germany, Netherlands, Sweden and UK).

## Project Partners

RUPPRECHT CONSULT Forschung & Beratung GmbH

INSTITUT VEDECOM DU VÉHICULE DÉCARBONÉ ET COMMUNICANT ET DE SA MOBILITÉ

PTV GROUP the mind of movement

GROUPE RENAULT

University of Stuttgart Germany

iD4CAR

tass international A Siemens Business

UNIVERSITÀ DEGLI STUDI FIRENZE

vti

POLIS

FEHRL

City of Gothenburg

STUTTGART

MILTON KEYNES COUNCIL

Gemeente Helmond



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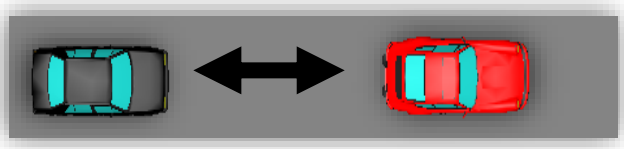
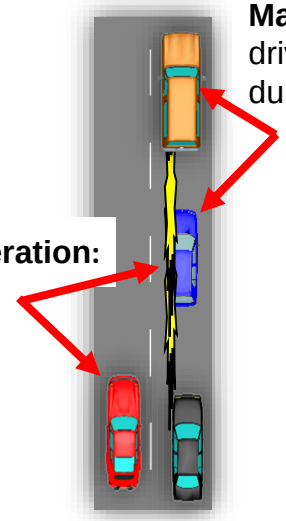
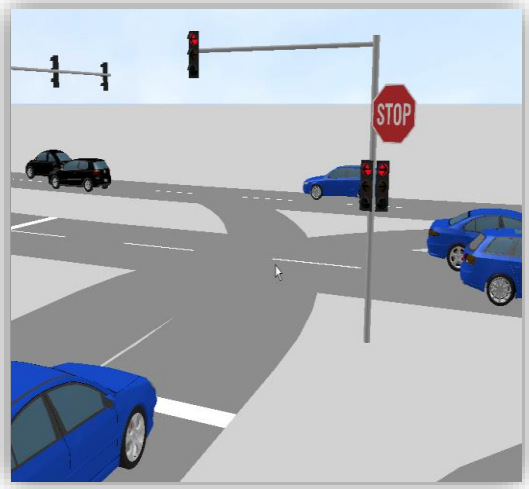
# Automation-Ready Modelling: CAV-Driver Behaviour

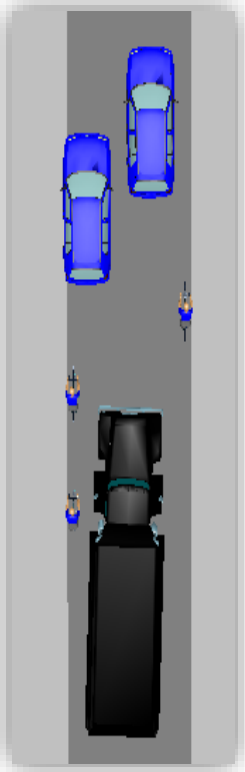


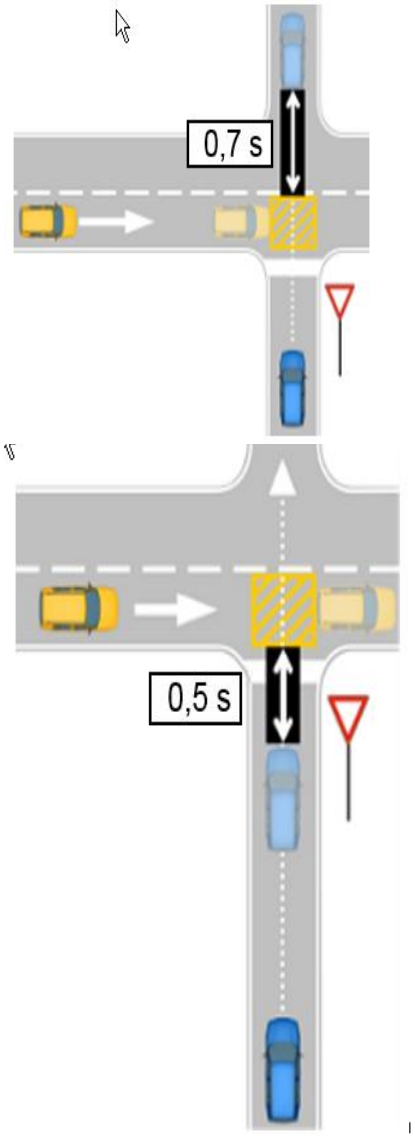


**Maneuver planning:**
driver accelerates
during lane changing

**Cooperation:**





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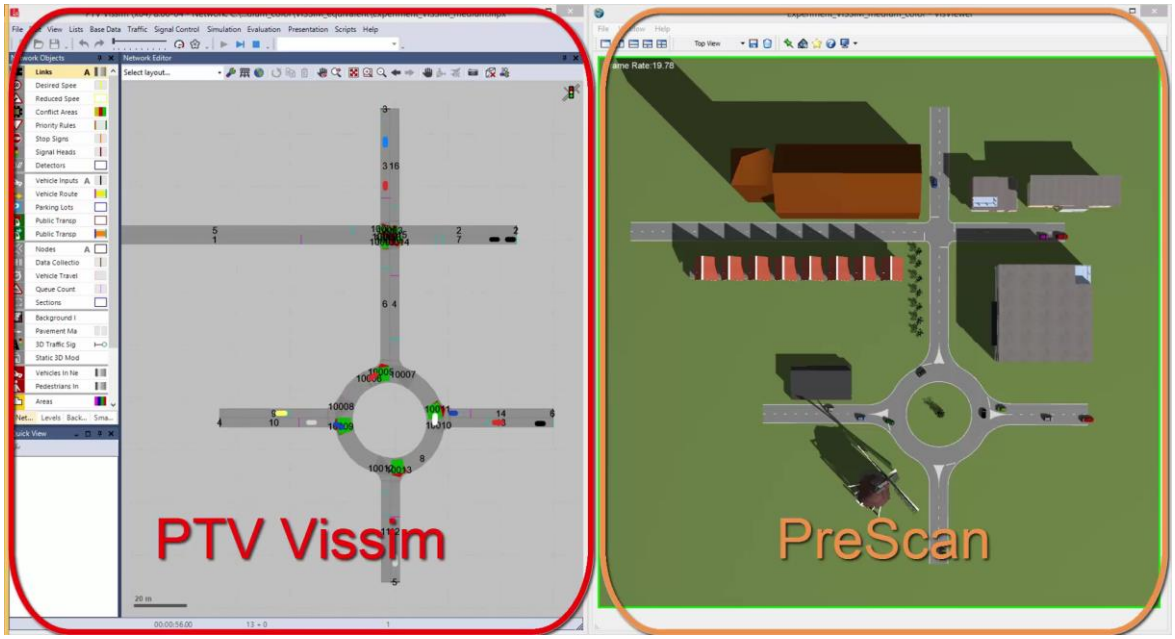
# Connecting CAV control logic, sensor simulator and traffic simulator

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# Default CAV-behavioural parameters sets

Default CAV-behavioural parameter sets

| SAE level | Name | Narrative Definition | Execution of Steering and Acceleration/ Deceleration | *Monitoring* of Driving Environment | Fallback Performance of *Dynamic Driving Task* | System Capability *(Driving Modes)* |
|---|---|---|---|---|---|---|
| ***Human driver* monitors the driving environment** | | | | | | |
| 0 | **No Automation** | the full-time performance by the *human driver* of all aspects of the *dynamic driving task*, even when enhanced by warning or intervention systems | Human driver | Human driver | Human driver | n/a |
| 1 | **Driver Assistance** | the *driving mode*-specific execution by a driver assistance system of either steering or acceleration/deceleration using information about the driving environment and with the expectation that the *human driver* perform all remaining aspects of the *dynamic driving task* | Human driver and system | Human driver | Human driver | Some driving modes |
| 2 | **Partial Automation** | the *driving mode*-specific execution by one or more driver assistance systems of both steering and acceleration/ deceleration using information about the driving environment and with the expectation that the *human driver* perform all remaining aspects of the *dynamic driving task* | **System** | Human driver | Human driver | Some driving modes |
| ***Automated driving system* ("system") monitors the driving environment** | | | | | | |
| 3 | **Conditional Automation** | the *driving mode*-specific performance by an *automated driving system* of all aspects of the dynamic driving task with the expectation that the *human driver* will respond appropriately to a *request to intervene* | System | **System** | Human driver | Some driving modes |
| 4 | **High Automation** | the *driving mode*-specific performance by an automated driving system of all aspects of the *dynamic driving task*, even if a *human driver* does not respond appropriately to a *request to intervene* | System | System | **System** | Some driving modes |
| 5 | **Full Automation** | the full-time performance by an *automated driving system* of all aspects of the *dynamic driving task* under all roadway and environmental conditions that can be managed by a *human driver* | System | System | System | **All driving modes** |





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# CoEXist Use Cases

Shared Space

Accessibility during long-term construction works


Gothenburg (VTI)

Helmond (TASS)

Transition from interurban highway to arterial

Signalised intersection including pedestrians and cyclists

Legend:

Microscopic

Macroscopic

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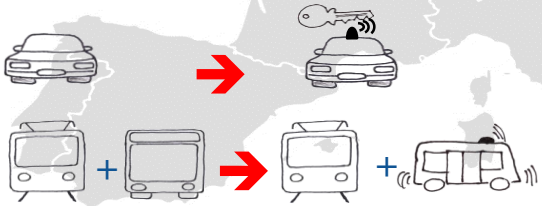
# CoEXist Use Cases

## Loading and unloading areas for freight

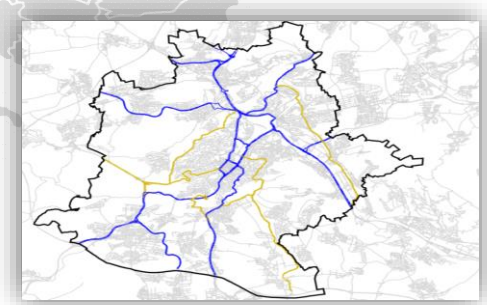

## Waiting and drop-off areas for passengers


**Milton Keynes (University of Cambridge)**

**Stuttgart (University of Stuttgart)**



**Impact of driverless car- and ridesharing services**



**Impacts of CAVs on travel time and mode choice on a network level**

Legend:

- Microscopic
- Macroscopic

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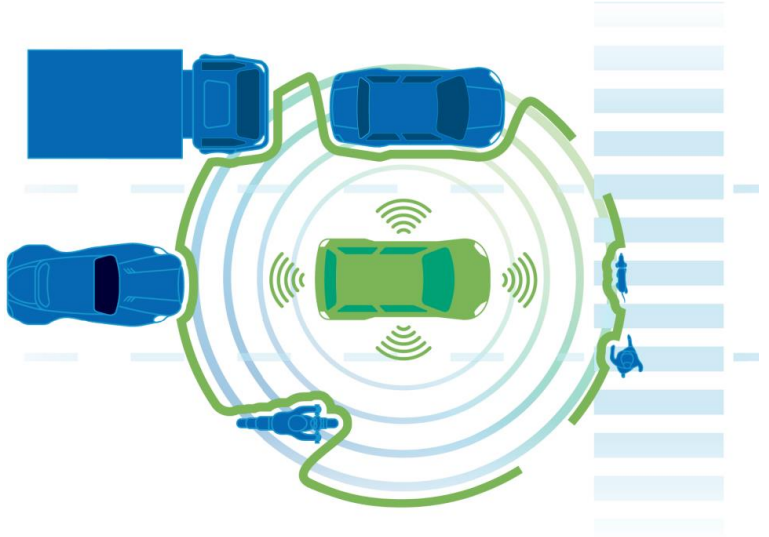
# Automation-Ready Local Authorities

- **CoEXist Automation-Ready framework**
- Guidance on issues like technology, impacts and measures
- Clear-headed and informed decisions about automation
- Automation FAQ for cities

- **Automation-ready action plans:**
- Bottom-up local stakeholder process – Automation-ready Fora
- Action Plan: Now, 5 years, 10 years
- Annex to strategic transport plans (e.g. SUMPs)





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# Automation-Ready Local Authorities

- Stakeholder engagement with over 30 cities
  - Definition “Automation-Ready“



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# Automation-Ready Local Authorities

- Stakeholder engagement with over 30 cities
  - Definition “Automation-Ready“
  - Vision / Mobility Goals for “Automation-Ready“ (e.g. CIVITAS Declaration)
  - “SAE levels“ don‘t work for urban transport policy making
  - “Automation-Ready“ Measures and Actions


**2030?**

**#Automation-ready CIVITAS**



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# Automation-ready measures to be taken in the next 15 years

| Mobility aspect | 0-5 years | 5-10 years | 10-15 years |
|---|---|---|---|
| **Policy** | Liveability needs to remain as the top priority<br>Support testing activities and research incl. legal and regulatory activities | Incorporation of CAVs into city mobility goals<br>Mobility pricing for "SPAM" roaming cars<br>Avoid segregation or prioritisation of CAVs over public transport and active modes | Taxation changes for mobility<br>(Potential) area and vehicle occupancy based road pricing |
| **Infrastructure** | Preparation of physical and digital infrastructure<br>Digital infrastructure needs to transition to open access | Reallocation of on-street parking to green and public spaces | Land use changes<br>Modifications to infrastructure and accompanying traffic code (e.g. lane markings, minor changes of infrastructure designs, speed limits, lane width) |
| **Planning** | Proactive planning<br>Planning for adaptability and flexibility to technology<br>Stakeholder engagement process to encourage cross-sectoral collaboration and coordination | Update travel demand models and evaluate road capacity needs<br>Assess public transport plans and fleet requirements considering CAV first and last mile solutions<br>Integration of solutions in mobility: electric, intelligent, automated, shared, inclusive | Integration of solutions in mobility: electric, intelligent, automated, shared, inclusive<br>Assessment of required land use changes based on integrated land use and transport modelling tools |
| **Capacity Building for Transport Authorities** | Stay educated on mobility technology progress | Reassessment of strategic mobility plans; incorporating new mobility forms | Training for traffic management and public transport operations<br>Restructuring of internal departments (e.g. information technology department, Mobility as a Service (MaaS) department) |
| **Traffic Management** | Road authorities need to be more involved in the discussion | Back office for data exchange in traffic management | Defining data management responsibility with new management schemes<br>New schemes of deploying municipal services, maintenance and logistics traffic at night in the urban area if autonomous functionality is available |

# Conclusion

- Urban transport policy making needs to be addressed first before automation-ready infrastructure can be deployed
- Cities need to develop a vision about automation (what do we want from it?)
- Multi-stakeholder process, e.g. online survey
- Automation needs to be defined from a policy perspective, and not from a SAE perspective.



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# Thank you for listening

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